

## CONTROLLED FLAME GAS BURNER

### THE FIELD OF THE INVENTION

5 A gas burner for a cooking top includes a burner body with a plurality of fingers, a plurality of peripheral ports along each of the fingers and controls for gas flow along and through the fingers.

### BACKGROUND ART

10 Although burners for controlling gas flow and flame generation in a cooking appliance have been known, a recent development that improves a flame spreading features within a controlled area so that the burner does not create a limited set of rings of heat application to a cooking utensil. For example, U.S. application serial No. 08/955,002 discloses a multiple fingered burner that expands the heating zone without exposing the peripheral ports in the fingers to exposure from spills occurring above the cooking top. Nevertheless, while such an arrangement improves distribution of the flames within a cooking top area, such 15 irregularly shaped burners often have difficulty, particularly when sealed to the cooking top and subjected to various flow rates of primary air, in maintaining appropriately sized flame kernels throughout the irregular pattern of kernels throughout the cooking top area.

20 Moreover, while the known multiple fingered burner for cooking tops includes a burner body made of multiple pieces, proper operation and fit between the pieces was made a function of the shaping of the pieces with interfitting portions aligned along predetermined matching points of the shape. As a result, unless the interfitting portions of the shapes were accurately aligned by a user attempting to assemble a disassembled burner, for example, after cleaning the burner pieces, the 25 user would have to use care in manipulating the pieces to physically align and fit the adjacent burner parts together, match the parts and properly connect the gas control paths. Slight misalignments may not be readily visible when parts have been prevented by some obstruction from nesting in a position that properly shapes the gas

flow channels. Such misalignments could adversely affect proper operation of the burner and interfere with generation and distribution of flame kernels, the formation of the kernels and the control of ignition of the proper flame.

## DISCLOSURE OF INVENTION

5           The present invention overcomes the above mentioned disadvantages by providing a multiple piece burner with multiple fingers that includes location controlling structural features that supplement the flow of gas for flame generation and distribution about the periphery of the burner. One novel feature employed is the use of recesses in the burner body, preferably in the burner cap lip that extend  
10       above peripheral gas ports, whereby flame continuity can exist around the entire periphery of the burner despite its convoluted or contoured shape for distribution of flame kernels throughout the cooking top area. An additional feature serving to improve control of the gas flow through the burner involves at least one indexer that properly aligns the plurality of the burner parts with respect to each other without  
15       masking any minor misalignments which can affect the ability of the burner pieces to precisely control the gas flow. As a result, the present invention improves the simplicity of using and cleaning cooktops and improves a user's ability to properly operate a reassembled burner body.

20           In a preferred embodiment, the burner body comprises a burner head having a plurality of ports or port forming openings along a peripheral wall of each of the plurality of fingers. The burner head is covered by a cap having a corresponding number of overlapping fingers extending laterally beyond the peripheral wall in the burner head. A plurality of flame guides connecting adjacent ports are formed in the extending portion of the cap, or in the peripheral wall, so that  
25       adjacent flame kernels may be connected by an ignitable path of gas flow. This structure assures continuity of the flame at all peripheral ports regardless of their location, alignment or distance from the burner's central source of gas supply to the ports.

In a preferred embodiment of the second novel feature, the burner body comprises a base for mounting the burner in the cooktop, preferably in sealed relation to the cooktop surface and at least one upper member defining, at least in part, a plurality of ports in a peripheral wall. Preferably, a collar carried by the base telescopically receives a stem carried by the at least one upper member with a sliding spline connection to form an indexer. Of course, the indexer may be carried by at least one of the collar and the stem, and limits insertion of the stem to a predetermined obtained between the at least one upper member and the base. As a result, the second feature aligns the upper member in a predetermined alignment with the base to assure that gas flow passages defined by surfaces of the parts are properly aligned for proper control of gas distribution throughout the periphery of the fingered burner when the burner parts appear to be in place. Any misalignment is readily, visibly indicated. A second indexer portion may also align additional portions of a burner, such as a burner cap, in relation to other parts of burner body, such as a burner head as shown in the preferred embodiment.

As a result, the present invention controls gas flow channels between displaceable burner parts by providing an indexing and nesting of the displaceable parts and assuring proper alignment in the nesting positions. In addition, the interaction of adjacent structures coupling the burner ports allows continuous flame generation between the ports so that continuity of flame around the irregular distribution of peripheral flame ports around the burner body is not affected by the distance from the gas supply or shaping of the body parts between the burner port inlets.

### BRIEF DESCRIPTION OF DRAWING

The present invention will be better understood by reference to the following detailed description of a preferred embodiment of the present invention when read in conjunction with the accompanying drawing, in which like reference characters refer to like parts throughout the views and in which

FIGURE 1 is a perspective view of a cooktop appliance using burners constructed in accordance with the present invention;

FIGURE 2 is an enlarged, exploded perspective view of a burner construction shown in FIGURE 1;

5                   FIGURE 3 is a sectional view taken substantially along the line 3-3 in FIGURE 1;

FIGURE 4 is a view taken substantially along the direction of the arrows 4-4 in Figure 3;

FIGURE 5 is a view taken substantially along line 5-5 in Figure 3; and

10                   FIGURE 6 is a view similar to Figure 3, but showing another position of parts shown in Figures 1-5.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring first to Figure 1, a cooktop appliance 10 is shown comprising a cooktop 12 fitting within a counter top 13. Nevertheless, it is to be understood that the appliance 10 may comprise a cooktop 12 adapted to be supported in a dedicated, fabricated housing or in a combined cooking appliance housing such as an oven, range, grill or other combination cooking appliance. In any event, the cooktop 12 includes a plurality of burners 14, although the location number and style of burners may be varied on the cooktop 12 without departing from the present invention. Nevertheless, at least one of the burners 14 includes a burner body 17 formed of a plurality of parts and the parts are interfitted so as to nest in a position that controls gas flow through and around the burner as will be described in greater detail below.

25                   In addition, the cooktop 12 includes a plurality of controls 15 and indica 19 for operating the ignition and control of the gas supplied to each burner 14.

Preferably, the control includes a microprocessor-based control, and preferably including a pulsed sequence burner operation in which flame may be ignited around the burner in a pulsed sequence so that areas of a cooking utensil are not continuously singed by exposure to open flame throughout a cooking period.

- 5 Nevertheless, the types of controls may be changed without departing from the scope of the present invention as will be discussed in greater detail below.

Each burner 14 may include a body 17 and, in the preferred embodiment, a grate 18 that provides a utensil support surface above the burner body 17. In the preferred embodiment, the burner body 17 is mounted in a fixed position with respect to the cooktop surface 16, and preferably a sealed burner installation that does not permit leakage of fluids, i.e. gas or liquid, between the cooktop surface 16 and the interior of counter top 13. The body may include means for self-aligning the grate 18 with respect to the burner 14 mounted in the fixed position on the burner surface 16. Nevertheless, it is to be understood that other means for supporting the grate 18 or the burner body 17 may also be used, for example, a cavity formed in the surface 16 that is dimensioned to receive the peripheral rim of the grate 18, or to receive a bottom of the body 17, without departing from the scope of this present invention.

Referring now to Figure 2, the body 17 as constructed in the preferred embodiment includes a burner head 20, a burner cap 40 and a burner base 50. Referring first to the head 20, the head includes central wall 24 that defines a plurality of fingers 22 extending outwardly from a center aperture 26 in a central wall 24 in the head 20. The central wall 24 supports a peripheral wall 28 including a plurality of openings 30 for forming ports in the body 17. In the preferred embodiment, the openings are in the form of slots 32 aligned in predetermined positions with respect to the fingers 22 of the body 17 as will be described in greater detail below. The central opening 26 is defined by a stem 36 including a plurality of external splines 38 (Figs. 3 and 5). Preferably, the splines 38 terminate at a flat wall that may be tapered or otherwise radiused to abuttingly engage like surfaces on a correspondingly splined part, either in the base 50 or in parts carried by the base

50, to form an indexer between the head 20 and the base 50, as will be described at greater detail below.

The peripheral wall 28 also includes terminal recesses 34 at the ends of each finger 22. Each recess 34 in the wall 28 includes a footing 42 intermediate two grooves 32. The grooves 32 on opposite sides of the footing 42 communicate with a recess 43 formed in the base wall 24 at the end of the finger 22.

In the preferred embodiment, the base 50 includes a central wall 60 having a raised support wall 62 that corresponds with the shape and positions of the fingers 22 formed in the burner head 20. The ends of each support wall finger 62 include raised footings 63 that support portions of the central wall 24 of the head 20 above the tops of the fingered support wall 62 and the central wall 60 of the base 50 to permit the flow of secondary air that aids combustion. In addition, the base 50 supports a mounting 64 for an igniter. In order to accommodate various materials employed in the construction of the burner parts, and the coatings that may be applied to the parts of the burner body, a mounting of the preferred embodiment of the invention includes a support 66 for a grounding stem 68 positioned adjacent a mounting opening 70 for an igniter plug. In addition, an opening 56 is formed in the center of the base plate 50.

The opening 56 receives a threaded sleeve 72 of a jet holder 74. The externally threaded sleeve 72 also includes internal elements, cooperating with the indexer - forming parts, for example, splines 38 of the burner head stem 36, to form the indexer. Preferably, the threaded sleeve 72 extends outwardly from an annular shoulder 76 of the jet holder, while the base 50 includes an expanded hole portion 78 that enables a threaded ring 80 to be threadedly engaged with the externally threaded sleeve 72 when the sleeve 72 has been inserted through the base 50 so as to lock a portion of the base plate, such as shoulder 82, between the threaded ring 80 and the annular shoulder 76. The base is then mounted to the cooktop.

In the preferred embodiment, the ends of the splines 38 on the stem 36 abut against the tops of the splines 78 formed in the interior of the jet holder 74 when the splines are not aligned with recesses in the indexer. As a result, the head 20 remains in a spaced position, as shown in Figure 6, above the base 50 and the fingers of support walls 62 unless and until the stem 36 is rotated so that the splines 38 align with recesses adjacent to splines 78 in the sleeve 72 as shown in solid lines in Figure 5. The predetermined alignment position may be a single position or, as in the preferred embodiment, the fingers of the head 20 may be disposed over any of the support walls 62 at numerous rotary positions.

As shown in Figures 2 and 3, the spaced slots 32 formed in the burner head 20 may have various cross sectional shapes, depths, widths, and orientations with respect to each other and the direction of the finger. In the preferred embodiment, the slots 32 are shown aligned with a plane intersecting the center of the head 20 from a point between the axes of adjacent fingers 22 and are preferably aligned as parallel with respect to each other along adjacent edges of the finger on opposite sides of the point. At the terminal ends of each finger 22, the footing 42 separates diverging ports 32 that communicate with the recess 43 in the central wall 24 adjacent the footing 42. The footing 42 receives a leg 84 formed on the cap 40. The arrangement of legs 84 and recessed footings 42 form a second indexer that limits installation to a correct alignment at which the parts cannot appear to be in proper position.

The cap 20 includes a plurality of tapered fingers 22 whose highest portion is at the center of the cap 20. In particular, a recess 86, corresponding with the area enclosed within the peripheral wall 28 of each finger 22, is formed in the cap 40. An intermediate wall portion between the recess 86 and the lateral extending lip 88 on the cap 40 is substantially flat over the top of the peripheral wall 28.

As best shown in Figure 4, the laterally extending lip 88 includes a plurality of recesses 90 that contribute to the flow of gas between adjacent port openings 30 to improve the continuity of flame around the irregular periphery of the burner. In the preferred embodiment, the deepest or widest portions of the recesses

lie adjacent to the peripheral wall portions 92 between ports to allow a large enough flow path between burner port outlets 30 to be maintained under the lip 88.

5 As a result, it will be understood that the burner of the present invention provides a wide distribution of flame at a burner location while ensuring continuity of the flame ignited around the irregular periphery, and maintaining a strict control of the gas flow. Similarly, control of the gas flow is aided by the interfitting parts of the burner that nest together in a predetermined position in order to maintain precise positioning of the flow path and accurate locating of the ignitor with respect to the ignitable port outlets of openings 30.

10 While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.